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At the Precipice of Collapse: Strengthening the Nonproliferation Regime through Comprehensive Arms Control Initiatives

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Table of Contents

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At the Precipice of Collapse

The threats to the Treaty on the Non-proliferation of Nuclear Weapons (NPT) have been described as "the most serious tests it has ever faced" and that they "strike directly at the core of the regime as nothing else does."[1] The 2006 National Security Strategy identifies nuclear weapons proliferation as "the greatest threat to our national security."[2] The spread of nuclear weapon technology and materials to regimes like Iran and the DPRK leads to regional destabilization and threatens the integrity of arms control and nonproliferation treaties and agreements. Left unchecked, this destabilization could disrupt regional balances of power and spark further proliferation. Some have stated that "it appears that we are at a 'tipping point' in proliferation...[and] [i]f Iran and North Korea proceed unchecked to build nuclear arsenals, there is a serious possibility of a cascade of proliferation following."[3] This potential cascade of nuclear proliferation is a serious risk to U.S. national security, as it increases the risk of nuclear terrorism. The cascading effect of proliferation and regional instability could also potentially threaten U.S. energy security and threaten the stability of the world economy. This alarming trend in proliferation has placed the nonproliferation regime at the precipice of collapse. Responsible and experienced U.S. leadership in pursuit of ambitious nonproliferation and arms control initiatives will deter the existential threat of nuclear terrorism and improve collective national security. Comprehensive U.S. arms control initiatives, such as ratifying the Comprehensive Test Ban Treaty and negotiating an improved Strategic Arms Reduction Treaty, will restore confidence in the nonproliferation regime and preserve national security.

Nonproliferation and arms control policy improvements will require significant compromise and commitment to come to fruition. Rescuing the nonproliferation regime and deterring nuclear terrorism, however, are not just the United States' problems. They are

international problems that require a dedicated U.S.-led effort to facilitate and encourage international solutions. The U.S and Russia have a combined nuclear arsenal that represents roughly ninety percent of the world's nuclear weapons. This position bestows upon the U.S. a "special responsibility, as well as the experience, to demonstrate leadership."[4] The U.S. must leverage its responsibility, experience and leadership to restore confidence in the nonproliferation regime through comprehensive arms control initiatives that include actions to ratify the Comprehensive Test Ban Treaty and negotiate a verifiable and binding Strategic Arms Reduction Treaty.

Nuclear Arms Control and Strengthening the Nonproliferation Regime

The relationship between arms control, nonproliferation and nuclear disarmament is the subject of a divisive debate between nuclear abolitionists, marginalists and deterrence advocates.[5] The graduated disarmament approach of the marginalists is a more pragmatic position that combines the benefits of nuclear abolition with those of nuclear deterrence. A critical study of the disarmament debate shows that nuclear arsenal reduction does support nonproliferation objectives and that arms control and nuclear nonproliferation are intrinsically tied due to political commitment and a normative standard. Nuclear arms control, from the marginalist perspective of graduated disarmament, is the best approach to providing lasting support for the nonproliferation regime, reducing the likelihood of nuclear terrorism and increasing U.S. national security.

The Disarmament Obligation

Interpretations of the wording and intent of Article VI of the NPT has spawned a large debate regarding the legal basis for disarmament. This debate centers on the relationship between nuclear arms control and the nonproliferation regime. Article VI requires that all

ratifiers "pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament."[6] Although the wording stipulates that the pursuit of nuclear disarmament satisfies the intent of the article, and the U.S and Russia have consistently done so, there are those who believe that Article VI and the Preamble mean much more.[7] Graham disagrees with the legalistic interpretation of Article VI and makes the case that disarmament must be viewed through a political lens as a "central bargain" of disarmament in exchange for nonproliferation. He refers to discussions and recommendations, like the 1965 non-aligned membership proposal and the 1995 and 2000 NPT Review Conferences, that tie nonproliferation with disarmament.[8] The validity of the "central bargain" that spawned the wording of the NPT Preamble and Article VI is important, but not for legal reasons. Ford and other NPT legalists are correct in arguing that the NPT, as it is worded, does not require disarmament. Graham's argument, however, is extremely important. The NPT wording was deliberate. It was a concessionary measure to placate American and Soviet concerns that the nonproliferation initiative would fail if it had too large of a mandate. Many believed then, and still do, that nuclear disarmament is an international objective. U.S. presidents have consistently pledged a commitment to nuclear arms reductions. World opinion polls suggest that a majority of Russian and American citizens, as high as seventy three percent (U.S.), favor the elimination of all nuclear weapons under the auspice of a strict international verification regime.[9] It is clear that both public sentiment and political commitment support nuclear arms control reductions as a normative standard without regard to NPT legality. It is sustained political leadership commitment, fueled by popular support, which drives the normative standard precedent for nuclear disarmament and intrinsically ties arms control with nonproliferation.

Does Nuclear Arms Control Cause Proliferation?

Deterrence advocates argue that nuclear proliferation will increase as nuclear arsenal inventories decrease. Tkacik proposes that fewer nuclear weapons create more opportunities for proliferation. He claims that the smaller arsenals of nuclear weapons encourage potential proliferators and that disarmament and nonproliferation cannot be mutually supportive.[10] A closer analysis of the relationship between nonproliferation and arms control demonstrates, however, that arms reductions reduce potential proliferator's security concerns and devalue the political value of nuclear weapons, thereby strengthening the nonproliferation regime.

The supposed linkage between lower arsenals and the rise of nuclear proliferation rests on the assumption that U.S nuclear arsenal reductions have a direct impact on a state's decision to become a proliferator. Domestic issues, not other state actions, are "among the most important independent variables determining proliferation."[11] States will take whatever action is required to ensure survival. This self-defense obligation, however, does not require nuclear weapons. Other factors, such as adequate intellectual assets, materials, technology, industrial capability, capital and popular support, play significant roles in the decision to determine if nuclear weapons are the best self-defense measure. Glaser argues that Nuclear Weapons State (NWS) disarmament would rarely tip the balance of nuclear weapon acquisition. He claims that Non-Nuclear Weapons States (NNWS) would be more apt to forego proliferation in the pursuit of their national security interests if there was an international atmosphere of nuclear abstinence.[12] Glaser's point challenges the premise of continued nuclear deterrence and supports the idea of graduated disarmament. Additionally, as previously mentioned, there is a groundswell of international support for a nuclear-free world. If the international community adopts the normative standard of reduced nuclear weapon salience, then graduated disarmament

would complement the nonproliferation regime by preventing the spread of nuclear weapons and materials. Iran, Syria and the Democratic People's Republic of Korea's proliferation, however, reveals that the prevailing international environment neither promoted nuclear abstinence nor prevented nuclear proliferation. The existing nonproliferation regime was ineffective in those aforementioned cases. Whether due to national interests, prestige or other possible reasons, those nations proliferated and acted in a manner contrary to both the legal tenets of the NPT and international norms. Those nations believed that a nuclear weapons program would solve a specific problem. Diplomacy and sanctions failed to address their problems, prevent their proliferation or condemn their actions in a reasonable and effective manner. An atmosphere of cooperation, transparency and collective action, which Payne describes as essential to the creation of an effective nuclear disarmament regime, was lacking.[13] A continued focus on strengthening existing and promoting new arms control initiatives will create an international environment of cooperation, transparency and collective action. This normative standard will reduce the salience of nuclear weapons and foster an environment that supports collective action to deter and contain proliferators.

The Case for Graduated Disarmament over Deterrence

Deterrence advocates provide convincing evidence that nuclear deterrence works. The Cuban Missile Crisis, the Yom Kippur War and the prevention of chemical weapons use by Iraq in the 1991 Gulf War are all examples where major conflict escalation was prevented by a strong U.S. nuclear deterrent.[14] Marginalism supports a strong nuclear deterrent. President Obama affirmed a marginalist approach when he stated that "[a]s long as nuclear weapons exist, we'll retain a strong deterrent."[15] Deterrence, in and of itself, however, is not the best approach to preventing proliferation. Graduated disarmament decreases the chance of a nuclear weapons

accident, better supports the nonproliferation regime and is the best solution to the threat of nuclear terrorism.

The disarmament argument that nuclear abolition reduces the possibility of accidental or unauthorized use comes under frequent attack by deterrence advocates. Glaser states that abolitionists have greatly exaggerated the danger of accidental or unauthorized nuclear weapon use. While he acknowledges concerns regarding the Russian command and control system, he believes that the risk of operator error pales in comparison with the danger presented by a state's break-out from universal disarmament. Admittedly, abolition does not have a good solution for the break-out problem and the "exceptional powers of intimidation" that break-out would yield.[16] Graduated disarmament, however, does address both deterrence advocates' concerns regarding nuclear break-out and abolitionists' concerns of "loose-nukes." The graduated approach to disarmament manages the break-out concern by controlling the rate of disarmament while developing the international cooperation necessary to counter possible disarmament problems. Graduated disarmament also addresses the accidental or unauthorized use concern by steadily reducing the number of nuclear weapons, thereby reducing the statistical probability of such occurrences.

Advocates of deterrence claim that a graduated reduction of the U.S arsenal to an international level of parity would question the validity of U.S. extended deterrence strategy. The lack of U.S. nuclear superiority would force allies to contemplate building a nuclear arsenal to guarantee their national security. Additionally, nuclear weapon levels that approach zero "increase proliferation incentives because it lowers the resource threshold to the point where even small states could create a strategically significant nuclear arsenal."[17] Furthermore, the validity of U.S. extended deterrence policy would be threatened by a shift from a U.S.-Russia

bipolar nuclear dominance to an international multipolar equality. This argument fails to account for the impact such factors as ballistic missile defense and American conventional dominance play in the overall allied proliferation tendency at a level of nuclear parity.[18] U.S. conventional dominance undermines deterrence advocate claims of weaker U.S. extended deterrence guarantees at lower nuclear arsenal force levels. U.S. conventional power projection, coupled with a U.S. nuclear deterrent, and a maturing missile defense network will assuage allied national security concerns and serve as a deterrent to allied proliferation. As nuclear arsenals continue to decline, the argument against disarmament shifts from extended deterrence concerns to concerns regarding political relationships and nuclear break-out. It is argued that the large conventional force superiority that the U.S. would require to support nuclear arsenal reduction would likely cause an increase in nuclear proliferation due to a perceived vulnerability to this superior conventional force. Glaser contends that "extremely good political relations" are required to support disarmament and that these political relationships would be susceptible to great strain if a state sought strategic military advantage through rearmament.[19] Graduated disarmament supports these arguments. Graduated disarmament beyond the level of parity requires the universal acceptance of the normative standard for disarmament. Fostering the normative standard and the requisite cooperative political environment to support graduated disarmament will require international leadership by the U.S. U.S. leadership to support these objectives will be provided through balanced arms control initiatives that bolster support for the nonproliferation regime.

The threat of nuclear terrorism is inadequately addressed by nuclear deterrence advocates. Large stockpiles of excess nuclear warheads present greater opportunities for proliferation and terrorist acquisition. Nuclear disarmament reduces nuclear warhead inventories

and presents less opportunity for nuclear terrorism. The challenges of applying complex and expensive universal safeguards and security measures also decline as the number of weapons are reduced. Disarmament alone will not, however, act as the sole deterrent to nuclear terrorism. Arms control initiatives, coupled with strong nonproliferation programs, policies and initiatives, will be required to mitigate this threat. The threat of nuclear terrorism will exist as long as nuclear weapons and materials exist. It is for this reason that the U.S. must leverage its strong nonproliferation and arms control legacy and continue to pursue areas where improvement can be made. This direction is in line with Obama Administration objectives. Secretary of State Hillary Clinton, during her Senate confirmation hearing, stated that the pursuit of nuclear arms control efforts was among the three top policy priorities for the new administration.[20] The U.S. must leverage its responsibility, experience and leadership to restore confidence in the nonproliferation regime through comprehensive arms control initiatives such as the ratification of the Comprehensive Test Ban Treaty (CTBT) and negotiate a verifiable and binding Strategic Arms Reduction Treaty (START).

Strategic Arms Control and START III

The first arms control initiative that will serve to restore confidence in the nonproliferation regime is an improved Strategic Arms Reduction Treaty (START). Negotiations on START III will send a clear signal to the international community that the U.S. continues to take disarmament and the integrity of the nonproliferation regime seriously. START, along with the 2002 Moscow Treaty (Strategic Offensive Reductions Treaty), is an essential part of U.S.-Russian confidence-building measures that pursue the goal of greater national cooperation and strategic transparency. Its legacy of controlled nuclear arms reductions with a comprehensive verification and notification regime has brought some stability to the

national security concerns of the United States and Russia. An improved START III will continue that legacy by seeking improvements to the existing arms control regime. START III negotiations should focus on the following four central topics: (1) the abolition of all tactical nuclear weapons and their delivery vehicles, (2) the reduction of nuclear arsenals to a maximum of 1000 nuclear warheads with no more that 500 warheads in an operationally deployed status, (3) a flexible, verifiable and reversible conversion plan that allows nuclear forces allocation for dual-use conventional roles pending proper notification and inspector verification and (4) a less cumbersome and more cost-effective monitoring, verification and counting process that leverages technology and lessons learned. Two prerequisite issues require resolution to ensure that essential groundwork is laid to allow for successful treaty negotiations. First, START I should be extended, in accordance with Article XVII, for a period of five years in order to keep the current verification and notification regime active until START III is ratified by both states. Second, Russian concerns with U.S. ballistic missile defense deployment in Europe must be addressed in a manner that satisfactorily meets the national security interests of the U.S., Russia and European allies. Achieving the two prerequisite issues and the successful inclusion of the four START III treaty recommendations listed above will strengthen U.S.-Russian relations, improve national security and promote nonproliferation efforts by lowering the salience of nuclear weapons.

The First Step

START I limitations, notifications and verifications expire with the treaty in December 2009. Officials from both governments have expressed the desire to have a legal, verifiable strategic arms control agreement that continues to provide strategic stability for both nations.[21] In her report to Congress, Amy Woolf provides an excellent discussion of the options available

to deal with the expiration of START I. She explains in detail how the Treaty can be extended, allowed to elapse, extended and amended or replaced with a new treaty.[22] Allowing the treaty to expire does not meet the goal of ensuring continued strategic stability that both Russian and the U.S. desire. The option to extend and amend START I would require amendment negotiations and government ratification to be completed by December 2009. It is highly unlikely that this process could be completed before START I expires. The option to negotiate and ratify a completely new treaty before the end of 2009 is also highly unlikely to occur due to time constraints. Extending START I for five years, per Article XVII of the treaty, is the only option that would allow sufficient time for the requisite diplomatic and political process to transpire without sacrificing the vision of an improved START III. This action, followed by a firm, verbal commitment by both the U.S. and Russian presidents to pursue diligently a new strategic arms control treaty, would boost international confidence in the U.S. and Russian commitment to nuclear arms reductions.

Cooperative European Missile Defense

Russia perceives the U.S. deployment of ballistic missile defense interceptors and radar systems in Poland and the Czech Republic as a national security threat. Sergey Kislyak, former Russian Deputy Foreign Minister and current Russian Ambassador to the U.S., called the deployment of this equipment "an element of a larger picture" that is part of an "overall effort to undermine strategic deterrence."[23] This Russian concern should be addressed outside of the START framework and must involve a cooperative agreement that combines both nations in a collective missile defense of Europe. The initial groundwork for this concept has been laid and there are indications that an agreement is plausible such that both nations can move past this strategic impasse and allow negotiations on START III to move forward.[24] John Rood revealed

actions to increase transparency of U.S. action that included allowing access to Russian liaison officers.[25] The Russian Ambassador to the U.S. discussed a Russian proposal for a joint monitoring station in Azerbajian.[26] A framework for cooperative ballistic launch monitoring already exists in the Clinton-Putin Memorandum of Agreement to establish, in Moscow, the Joint Data Exchange Center (JDEC).[27] The answer to this impasse lies in a multilateral agreement that negotiates locations for employment of joint radar systems and interceptors, flexible site access for validation of system operation and real-time information sharing of missile threat warnings via JDEC. Leveraging Russian technology and assets with American and/or European Union (EU) technology and weapons will ease U.S-Russian-NATO tensions, enhance stability and promote strategic transparency. A European Ballistic Missile Defense Accord that establishes a cooperative U.S., EU and Russian defense of Europe would enhance Russian national security and would serve as an impetus to facilitate START III nuclear arms reductions due to this collectively beneficial security agreement.

Tactical Nuclear Weapons Abolition

A complete abolition of tactical nuclear weapons will improve national security, strengthen the nonproliferation regime and benefit arms control efforts by further reducing the salience of nuclear weapons. Tactical nuclear weapons are a remnant of a Cold War threat that no longer exists. By their very nature, small and more mobile tactical nuclear weapons pose a greater risk for proliferation and are an attractive target for terrorist acquisition. The threat of nuclear weapon theft presents a much greater threat to national security than the threat of an overwhelming conventional attack these weapons were designed to deter. The U.S. removal of these weapons from Europe would neither degrade the national security of NATO allies nor diminish U.S. extended deterrence agreements with European allies. The benefits of a U.S.-

Russian commitment to complete and irreversible tactical nuclear weapon abolition would be twofold. First, the elimination of tactical nuclear weapons would remove a potential nuclear weapon acquisition opportunity for terrorists. Second, removal of U.S weapons from foreign soil would resolve a long-standing Russian concern and supports a more cooperative U.S.-Russian . Such an environment is critical to strengthening the international norm supporting graduated nuclear disarmament. A potential roadblock to Russian tactical nuclear weapon abolition is U.S. conventional superiority. In order to address this concern, the U.S. should reaffirm its commitment to the ratification of the Adapted Conventional Armed Forces in Europe (CFE) Treaty. This reaffirmation toward conventional force limitations will further add to European stability and transparency. Abolishing tactical nuclear weapons would reduce the salience of nuclear weapons, further improve European stability and nation security and foster a more cooperative political environment.

Arsenal Reduction

START III should seek an overall nuclear weapons arsenal reduction, to include warheads operationally deployed and in strategic reserve, to a 'parity plus' level of 1000 warheads. This action will remedy on START I shortfalls by expanding beyond deployed delivery vehicle counting methods to accounting for the actual number of warheads retained. Parity plus should limit operationally deployed nuclear weapons to no more than 500 warheads, with the remaining 500 warheads maintained in an active or inactive reserve capacity. This aggressive arms control reduction initiative must retain a pragmatic "trust, but verify" position that ensures compliance through inspections and verification.[28] Reduction of the U.S arsenal, coupled with a flexible and responsive force structure, will improve national security, strengthen

the U.S.-Russian partnership through trust and cooperation, and strengthen the nonproliferation regime.

Reducing the U.S. nuclear arsenal to a level of parity plus will not have an impact on U.S. deterrent strategy. As noted earlier, allied assurance of U.S. protection from nuclear attack will not be affected by an arsenal reduction. The Federation of American Scientists estimates that the largest nuclear forces, after those of the U.S. and Russia, are France (with approximately 300 weapons) and China (with around 240 weapons).[29] U.S. operationally deployed nuclear forces will continue to represent a size at least twice as large (or equal to in the case of Russia) as the size of any potential nuclear adversary. Thus, reducing the U.S. arsenal to 1000 nuclear weapons will not threaten U.S. superiority or its policy of extended deterrence.[30] Due to the relatively large nuclear arsenal retained, concerns regarding the strength of the U.S. deterrent and U.S deterrence strategy will not need to be readdressed until warhead levels are lowered to a level at parity with other Nuclear Weapons States (NWS) such as France and China. Overall, reducing the U.S. arsenal to 1000 warheads will have no impact on deterrence or extended deterrence strategy and will bolster efforts to shore up the nonproliferation regime.

The flexibility of the New Triad, as outlined in the Nuclear Posture Review, allows for adjustments to force structure without sacrificing the viability of the nuclear deterrent.[31] Strategic nuclear forces would be divided between conventional missions (long range bombers), strategic conventional missions (bombers and intercontinental missiles (ICBMs)) and strategic nuclear missions (bombers, ICBMs and ballistic missile submarines (SSBNs)). The Strategic Command's concern regarding the integrity of the original Triad at operationally deployed nuclear weapon levels less than 2000 is met with this allocation of forces.[32] Leveraging the nuclear and conventional capability of all delivery platforms allows for a sharp reduction in

operationally deployed nuclear warheads without the loss of one leg of the original nuclear Triad. Additionally, the allocation of dual-use nuclear forces to conventional strike missions supports future Prompt Global Strike missions.[33] The operational nuclear forces should be divided so as to provide the preponderance of nuclear strategic missions to the ballistic missile submarines. Bombers, ICBMs and SSBNs would then be allocated, as required, as a responsive strategic reserve force for the remaining 500 nuclear weapons in the active or inactive reserve stockpile. This force structure would retain the capability to respond to emerging national security threats, preserve strategic flexibility and allow for an expanded use of conventional and conventional strike capabilities while preserving the integrity of nuclear disarmament.

START III Monitoring, Verification and Counting

START III monitoring, verification and counting must leverage technology and lessons learned to make the process less cumbersome and more cost-effective while ensuring compliance with treaty obligations.[34] Verification must include a new method to ensure irreversible warhead destruction. START III counting methods must have added flexibility to allow for dual-mission capability while limiting operationally deployed strategic nuclear weapons to 500 warheads. By leveraging technology and relaxing burdensome requirements, START III will improve strategic flexibility and transparency, lower costs and increase national security at lower arsenal levels.

Inspection and notification requirements should be reduced through a more flexible and relevant approach that leverages improved relationships and technology.[35] Short notice inspections should be eliminated in favor of less structured visits. Challenge inspections should be added to allow for a mechanism to investigate suspected treaty violations lost though the elimination of the short notice inspections. Notification requirements should be reduced to include only significant events such as missile launches, field exercises and delivery platform

mission shifts. Most START notification requirements can be verified with national technical means of verification (NTM) and do not require the additional notification redundancy. Augmenting NTM with more comprehensive remote optical monitoring will act to further reduce notification requirements. Additionally, more frequent data exchanges, validated by remote monitoring and NTM, would build confidence in the accuracy of information and the transparency of action while reducing the cost and burden associated with START I-mandated on-site verification requirements. Comprehensive remote monitoring, additional data exchange and reliance on NTM with reduced requirements for on-site inspections and the elimination of redundant notifications would make START III less costly and burdensome while improving transparency and flexibility.

START III counting rules must be modified to permit dual-mission flexibility and remove the penalty for counting delivery vehicles awaiting disposal. Under START III, dual-use vehicles could be decertified for nuclear missions by a pre-approved and verifiable method. This verifiability could be done by NTM or remote optical monitoring with the decertification process subject to prior notification and subsequent challenge or routine inspection. The decertified ICBM or bomber, cleared for non-nuclear missions, would be exempt from START III counting. The process for counting decommissioned delivery vehicles would also be changed to allow for a similar decertification process, coupled with storage at NTM-monitored disposal sites, in order to prevent them from being counted as a viable delivery vehicle. Under START III, Russia and the U.S. would be permitted to retain enough submarines, aircraft and missiles to deliver a maximum of 1000 nuclear warheads, not to exceed 500 operationally deployed warheads. Those ICBMs, SSBNs or bombers in excess of that required to deliver 1000 warheads would be decertified for nuclear missions, converted to conventional use, or decommissioned and destroyed. These

START III counting modifications will ensure strategic and operational flexibility while maintaining a strong nuclear deterrent.

START III will require the verifiable and irreversible destruction of nuclear warheads. The verification of warhead destruction is complicated by the safeguards that must be in place to protect the classified nature of warhead construction and composition. The model for this process has already been developed through efforts of the Trilateral Initiative. Under the joint Russia, International Atomic Energy Agency (IAEA) and U.S. venture, the "technical, legal, and financial approaches that would allow the IAEA to conduct [warhead destruction] verification [were] developed and demonstrated."[36] This verification process would protect classified information regarding weapon material and construction, enhance strategic arms reduction transparency and ensure the verifiable and irreversible destruction of nuclear warheads.[37] Nationally controlled and IAEA monitored in accordance with NPT safeguards, the fissile material would be removed from weapons use and made safe from potential proliferation.

Comprehensive Nuclear Test Ban Treaty

The Comprehensive Test Ban Treaty (CTBT) is a unique instrument that supports both the nonproliferation regime and arms control initiatives. Support of the treaty signals a nation's dedication "to fulfilling their NPT Article VI commitment to end the arms race and pursue measures leading to nuclear disarmament."[38] The CTBT, however, has not entered into force due to the lack of nine of the forty four Annex II states ratifying it. The most notable of the nine non-ratifiers are China and the United States.[39] In October 1999, during a time-compressed and politically-charged debate, the U.S. Senate voted against ratifying the CTBT. The most notable reasons for ratification failure surrounded the "role and purpose of nuclear weapons test explosions; what constitutes an effective stockpile stewardship program; and whether other states

can gain militarily significant advantages relative to the United States under the CTBT regime."[40] Although this rejection struck a blow to the nonproliferation regime, the overall actions of the Senate were pragmatic and their rationale had validity. In light of President Obama's 2008 promise to "work with the Senate to ratify the Comprehensive Test Ban Treaty and then seek its earliest possible entry into force," the original issues that led to Senate rejection of the treaty must be adequately addressed.[41] Programs in place to maintain and test the U.S nuclear arsenal have ensured both that the weapons are safe and reliable and that the arsenal will continue to serve as a strong nuclear deterrent without the need for testing. Additionally, significant improvements have been made since 1999 in the establishment of a global nuclear testing verification regime. The assurance that the nuclear arsenal will continue to protect U.S. national security, a better understanding of the treaty's impact on U.S. and potential violator activity and an effective treaty monitoring system will clear the path for Congressional ratification of the CTBT.

CTBT Constraints

The Comprehensive Test Ban Treaty will impose limitations and constraints on the United States. The CTBT will oblige each state party to "not carry out any nuclear weapon test explosion or any other nuclear explosion." The treaty preamble recognizes that by "constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of weapons" that the universal ban on all nuclear explosions constitutes an effective disarmament and nonproliferation effort.[42] The treaty is worded such that the testing ban is an obligation whereas the preamble statement is an understanding. Therefore, although the CTBT is an effective step toward nuclear disarmament, it neither directs disarmament nor limits nuclear weapon states from taking prudent action to maintain safe and reliable nuclear

arsenals. Additionally, as the legal requirements of the CTBT are worded, there is no restriction on less than zero-yield testing. Subcritical experiments that use fissile material but produce "no self-sustaining nuclear fission chain reaction" are examples of permissible testing per the CTBT.[43] Because testing activities like hydronuclear testing requires fission to occur, these tests are prohibited per the CTBT. The Stockpile Stewardship Program (SSP), explained in much greater detail later in this essay, is permissible. Hydrodynamic testing, done to "assess the performance and reliability of nuclear weapons primaries," does not produce a fission yield and is also allowable under the CTBT regime.[44] Beyond testing, the U.S. must add state-specific ratification conditions. These conditions, tailored from those President Clinton expressed to the Senate in 1997, should be affixed as preconditions to treaty ratification. These safeguards should be endorsed by Congress and noted when the articles of ratification are deposited. Conditions such as the continued conduct of the SSP, retention and modernization of nuclear complex capabilities and the "supreme national interests" clause will preserve the integrity of the U.S. nuclear deterrent and reaffirm the American sovereign right to act as required in the interest of national security.[45] These safeguards, combined with an understanding of the CTBT constraints, will ensure treaty obligations are met without sacrificing national security objectives.

A Safe and Reliable Deterrent

The nuclear arsenal must be both safe and reliable in order to serve effectively as a deterrent in support of the U.S. national security strategy. Although nuclear disarmament is a key part of the overarching goal to restore nonproliferation regime credibility, the U.S. must retain a strong and effective nuclear deterrent until such a time as nuclear weapons are abolished.[46] Until a decade ago, the only effective means to ensure stockpile reliability was through nuclear testing. Since the 1992 nuclear test moratorium, testing to verify stockpile

reliability and weapon effectiveness has been unavailable. In 1994, the Stockpile Stewardship Program (SSP) and the Lifetime Extension Program (LEP) were created to fill this reliability void. Although these programs have continued to certify the safety and reliability of U.S. nuclear warheads, questions remain regarding the ability of the SSP and LEP to maintain high confidence in the arsenal with the continued deterioration of weapon components due to aging. The CTBT benefits of constraining international nuclear weapons development are placed at odds with the seemingly difficult ability to ensure the vitality of the nuclear deterrent against the unpredictability of warhead aging. One recommended solution to counter the unpredictable future of the legacy arsenal is the Reliable Replacement Warhead (RRW). The RRW, however, is not a guaranteed solution to the problem of arsenal aging. The scientific community is unable to offer absolute certainties as to the safety, reliability and effectiveness of either the legacy arsenal or the RRW. This uncertainty weighs heavily on U.S. leadership as the decision on the future of the nuclear deterrent lies in the management of risk. General (ret.) Shalikashvili captured the essence of this concern in his 2001 letter to President Clinton when he stated that the central question to the CTBT debate was "whether the contributions that the Test Ban Treaty can make to national and international security outweigh any potential risks."[47] Review of the SSP and RRW program reveals that the RRW is not the best solution for a safe and reliable U.S. nuclear deterrent. The SSP, using proven safe and reliable weapons, effectively manages the risks associated with the retention and maintenance of the existing stockpile. The benefits that Stockpile Stewardship offer best support U.S. nonproliferation policy and national security objectives.

The SSP, along with the LEP, serve to ensure that the "weapons that the nation needs [remain] safe, secure, and reliable."[48] These programs replaced nuclear testing that, when

performed, comprised less than one percent of all testing performed by the U.S for stockpile reliability. In fact, most previous testing was actually done to validate new weapon effectiveness, not stockpile reliability.[49] Since its inception, the SSP has compiled years of data, leveraged data from more than 1000 nuclear tests performed by the U.S. nuclear weapons program, and has increased in scientific and technological maturity. The reliability of the stockpile, it is claimed, is technically better today than it was before the testing moratorium.[50] Thomas P. D'Agostino, National Nuclear Security Administration Administrator (NNSA), testified before Congress that the legacy arsenal is safe and reliable due to "cutting edge scientific and engineering experiments and analysis, ...improved warhead surveillance [and] [m]ost importantly, ...from the professional (and independent) judgment of our laboratory directors advised by their weapon program staffs."[51] 2008 Congressional testimony by the Los Alamos National Director revealed that a more clear understanding is now available regarding major sources of stockpile issues such as birth defects, aging and design limitations. He stated that "[f]or the 12th consecutive year in September 2007 ...there was no requirement for nuclear testing ...to maintain the certification."[52]

The challenges that the SSP and LEP are presented with, however, are daunting. The fissile materials in a nuclear weapon are subject to corrosion. Several components are corrosive and materials, such as plastics and adhesives, are subject to deterioration. Decay products and decomposition materials can migrate to other parts of the warhead and have a negative effect on the weapon. All these effects impact confidence in the reliability of the nuclear warhead. A Sandia National Laboratory report states that "as systems age and [warhead] lives are extended, changes due to aging or repair creep into the system that make it more difficult to predict performance, and repair itself becomes more challenging as we move further away from the

design era."[53] D'Agostino acknowledges the negative effects of aging, and adds that there are potential negative effects that subsequent refurbishments have made to the warheads, under the LEP, due to the small original design margins in the legacy weapons.[54] In addition to potentially negative impacts design margins, LEP has also been characterized as a long, complicated and expensive process that requires the use of archaic processes and dangerous substances to repair defective materials in the aging weapons. Regardless of these criticisms, LEP continues to be successful in refurbishing the legacy arsenal. Additionally, processes, utilized through the SSP, have been created to minimize the impact that small warhead changes have on arsenal reliability and performance. NNSA has created a program that quantifies the margins and uncertainties associated with legacy weapon performance that serves to validate, with greater confidence, the expected performance of legacy weapons.[55] One example of the continued success of LEP is the W76 program. Currently in production, the W76 LEP will provide three-decade-old submarine launched ballistic missile warheads a life extension of another thirty years. Compared to the unknown costs of designing, manufacturing and certifying a new warhead design, LEP represents a more cost-effective method to sustaining the nuclear arsenal with minimal changes from original testing-validated design parameters.[56] Even with the success of LEP and SSP, however, neither program can guarantee absolute arsenal safety, reliability and effectiveness. This uncertainty represents the risk that leadership must manage when determining the best way to assure the continued viability of the nuclear deterrent.

The benefits of phasing out the legacy arsenal with the RRW do not outweigh the costs and risks associated with the program. The RRW will replace an arsenal that has been consistently proven safe and reliable. As noted earlier, the RRW will be susceptible to the same aging and uncertainty issues that surround the legacy arsenal. Proponents of the RRW claim that

the newly-designed warhead will increase long-term confidence in the nuclear arsenal and will incorporate lessons learned from the SSP. The weapon will be designed with increased performance margins, enhanced safety features, improved maintainability, fewer hazardous and exotic constituents and will be easier to manufacture. Additionally, RRW design utilizes existing weapons testing parameters and will be designed for ease of certification without testing.[57] There are, however, three major concerns with the RRW solution to legacy stockpile confidence issues. First, the basis for creating a new warhead to increase confidence in the safety and reliability of the arsenal is not based on historical facts. The legacy arsenal has been deemed safe and reliable, by both the NNSA and the National Laboratories, every year for more than a decade. D'Agostino's statements to Congress that LEP activities "may pose unacceptable risks to maintaining high confidence in warhead performance over the *long-term* absent nuclear testing" are presumptuous.[58] RRW is a "hedge" against an unknown future. While it is prudent to prepare for contingencies, and the potential for a future fatal flaw in a legacy weapon cannot be ruled out, it is by no means certain that any warhead will fail to meet safety and reliability criteria anytime in the future. The Nuclear Weapons Complex Assessment Committee assessed that the SSP had provided a "substantial measure of confidence in the safety and reliability of weapons" that was due "in part, to the work of the surveillance and refurbishment programs." Although it is possible that multiple refurbishments could lead to stockpile uncertainties, it is also possible that further advancements in the SSP could offset this uncertainty.[59]

The second concern is the long-term confidence in weapon performance. Legacy weapons were built to a closer design performance margin while RRW will be built to an increased margin. Regardless of performance margins, however, both weapons will utilize the same fissile materials and a version of high explosives as the essential ingredients of the physics

package. These components, like in the legacy weapons, will be susceptible to the effects of aging. The effects of aging and the deterioration of non-nuclear components will require a similar SSP, as stated above, and may require a LEP to repair critical degrading factors that reduce confidence in warhead performance. Additionally, larger performance margins are unlikely to counter the historical trend that most "birth defects gradually reveal themselves over the first years" after production. These flaws, or "findings," will undoubtedly apply to the RRW and will require the extensive experience of the SSP and LEP to remediate findings without performing nuclear testing to validate repairs.[60] Lastly, the cost of new facilities, improved manufacturing processes and equipment, technology required, materials and manpower has not been determined. Although it is impossible to put a price on national security, the necessity of such an enormous undertaking must be vital to the safety and viability of the nuclear deterrent. It is highly improbable that the RRW program will result in a cost savings as compared to the existing SSP, and in fact, will more than likely require increased SSP funding. The RRW program is a phased replacement plan for the legacy arsenal, and as such, will require the SSP program to monitor and maintain the legacy stockpile while beginning new surveillance on the RRW stockpile. The only potential savings from the RRW program, a potential cancellation of the existing stockpile LEP, would be dwarfed by the cost of the RRW production program and the cost of including the RRW in the SSP. The RRW program will not increase stockpile confidence over that currently enjoyed with the SSP and the legacy arsenal. The RRW is the wrong answer for the future of the U.S. nuclear arsenal.

Both the Stockpile Stewardship Program and the Reliable Replacement Warhead program have some amount of risk that must be assessed and managed. Although the RRW program is wrong as a legacy arsenal replacement, it is does represent a contingency plan that

must be fully designed and developed. The RRW must be production ready if a fatal stockpile flaw is uncovered, a military shortfall is discovered that requires a unique nuclear solution or an emerging threat to national security requires a shift in nuclear capabilities. The RRW, however, should be leveraged solely as a hedge against an uncertain future. Producing RRW as a phased replacement for a proven and reliable legacy arsenal does not make sense. It provides no appreciable increase in national security and would be an economic burden to an already struggling economy. The diplomatic ramifications of producing the RRW and subsequently needing to perform testing due to an unforeseen problem would be detrimental to U.S. foreign policy, damage U.S. credibility and threaten nonproliferation objectives. The SSP and LEP continue to ensure the safety and reliability of the nuclear deterrent in support of U.S. national security strategy and extended deterrence obligations. Effective risk management and thorough planning for contingencies will continue to make the legacy arsenal an effective deterrent without a need for future testing.

The Verification Regime

The CTBT verification regime, as outlined in Article IV, ensures treaty compliance through the International Monitoring System (IMS), the International Data Center, Confidence Building Measures and On-Site Inspections.[61] These elements are designed to provide a high level of confidence that very small nuclear tests of military significance will be detected. The lack of an adequate nuclear testing verification regime was one of the two most significant factors leading to the 1999 Congressional refusal to ratify the treaty. The CTBT 'verification regime,' however, is a monitoring regime, not a verification regime, with the onus of verification left to parties to the treaty. The verification regime, with its one kiloton detection threshold, cannot detect all potential types of testing. The determined proliferator could perform some

types of nuclear testing with a marginal chance of evasion. The CTBT is, however, the best of the alternatives. The 2002 National Academy of Sciences report stated that "[t]he worst-case scenario under a no-CTBT regime poses far bigger threats to U.S. security interests...than the worst-case scenario of clandestine testing in a CTBT regime, within the constraints posed by the monitoring system."[62] Regardless of its flaws, the verification regime, augmented by U.S. NTM, enhances U.S. and allied national security. Through monitoring and inspections, the CTBT verification elements increase the likelihood of test detection, reduce potential proliferation by reducing test evasion confidence and increase U.S. national security by preventing the spread of advanced nuclear weapons programs.

The IMS is the core of CTBT verification. Designed with 321 monitoring stations, of which ninety percent are complete, the system will pass data to the International Data Center (IDC) in Vienna for analysis and reporting. With approximately seventy five percent of all facilities operationally certified, the system was deemed sufficiently mature to permit an independent assessment of the readiness of the system to detect a nuclear explosion.[63] The CTBT verification regime, however, is not without its problems. The International Monitoring System Division is faced with financial and logistical challenges in the upkeep of a global, ten-year-old system. Additionally, the IMS may not reach the target of 321 monitoring stations as political environments may preclude planned construction of some stations.[64] In the U.S., the IMS is augmented by the National Data Center (US NDC). This additional monitoring capability utilizes the U.S. Atomic Energy Detection System (USAEDS) and additional seismic arrays to support the CTBT and national objectives.[65] Additionally, the U.S. has NTM, such as satellite capabilities and intelligence assets, to assist in the monitoring and verification process.

The combination of IMS data, NTM, and US NDC data and analytical capabilities provide the U.S. with the monitoring and validation tools to perform effective CTBT verification.

The CTBT monitoring system is not perfect. Designed to detect a non-evasive nuclear explosion with a threshold of one kiloton, the IMS has the capability to detect underground Russian explosions of yields down to .01 kilotons and any underwater explosion down to yields of one ton (.0001 kiloton) or less.[66] Despite this greater than advertised detectability, there are several potential ways for a cheater to mask testing and evade detection. Medalia suggests "geologic preconditioning," decoupling, "radiation spectrum tuning," and hiding the test in an earthquake as methods for seismic detection evasion.[67] The 2002 National Academy of Sciences (NAS) report states that the most likely evasion scenarios involve mine masking and decoupling. Technical difficulties and insufficient practical experience limit successful evasion scenarios to one to two kilotons.[68] Evasion from atmospheric detection is also within the realm of possibility. Containment, such as in a salt dome, and deep burial can limit or prevent the release of tell-tale radioactive noble gases and particulate.[69] Interferometric Synthetic Aperature Radar (InSAR) satellite detection of the earth's subsidence can be defeated if prior radar data is unavailable.[70] Even On-Site Inspections may fail to detect a clandestine test if the test was buried deep and a telltale crater is missing. The critical issue of pinpointing the location seismically at regional distances is a challenge that the cheater can exploit.[71] Given that there is evasion is possible, the question becomes whether a test of military significance could be masked and whether successful clandestine testing threatens U.S. national security. The NAS report states that the highest yield that could be clandestinely tested would be one to two kilotons. That size of test would correlate to an unboosted fission weapon, as neither boosted nor thermonuclear weapons could be tested at such a low threshold. The most likely design for an unboosted fission weapon

would be a gun-type or implosion-type weapon that would be undeliverable by missile and would not pose a strategic threat to the U.S.[72] Unless testing were conducted with yields of at least .5 kilotons, the military significance to a cheater would be insignificant as a means to validate weapon performance.[73] At this yield, the potential for detection, as previously mentioned, becomes much greater. The potential cheater must weigh the chances of evading constantly improving monitoring systems versus the expense and difficulties of masking the nuclear explosion signature of a low yield test.

As stated by Medalia, the issue is not perfect verification but effective verification.[74] Even under the CTBT verification regime, evasion is possible. The likelihood of a militarily significant test going unnoticed depends on several factors that even the most experienced tester would be hard-pressed to overcome. The question becomes whether the extensive monitoring system is adequate to deter would-be cheaters, and if they do cheat, whether their testing will be detected. The data on system performance and sensitivity suggests that militarily significant testing would be, in most instances, detected. This fact alone will reduce the likelihood of evasion. These facts, coupled with the inability for NWS to test advanced weapons types, ensure that U.S. national security will not be threatened by either the spread of advanced nuclear weapon programs or the most likely evasion scenarios and serve to validate the effectiveness of CTBT verification.

Conclusion

The failure of the nonproliferation regime would directly threaten U.S. national security. The spread of nuclear material and technology to Non Nuclear Weapons States, rogue regimes and terrorists threatens international security and stability. Although the nonproliferation regime is at the precipice of collapse, is has not fallen. A U.S.-led international effort is required to

restore credibility in the regime and focus the cooperative energies of capable states to stop the rising trend in proliferation. Improvements in arms control and nonproliferation policy, such as ratifying the CTBT and negotiating an improved START, will reduce the salience of nuclear weapons and validate the normative standard for disarmament. U.S. action, however, must neither reduce the vitality of the U.S. nuclear deterrent nor place at risk the safety and security of the American people. Graduated disarmament is that tempered arms reduction solution that will support sensible nuclear arsenal reduction. Graduated disarmament will retain a flexible and responsive deterrent that will retain sufficient capability to respond to present and future threats to U.S. national security. Successfully negotiating the next strategic arms reduction treaty and ratifying the CTBT, however, will not guarantee the end of nuclear proliferation. A strong, fully supported nonproliferation regime will. A renewed U.S. commitment to tackle challenging arms control and nonproliferation issues will validate the efficacy of the nonproliferation regime and spark renewed international commitment to proliferation prevention.

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Executive Summary

Title: At the Precipice of Collapse: Strengthening the Nonproliferation Regime through Comprehensive Arms Control Initiatives

Author: LCDR Michael Concannon, United States Navy

Thesis: The U.S. must leverage its responsibility, experience and leadership to restore confidence in the nonproliferation regime through comprehensive arms control initiatives that include actions to ratify the Comprehensive Test Ban Treaty and negotiate a verifiable and binding Strategic Arms Reduction Treaty.

Discussion: The nuclear nonproliferation regime is near collapse due to a lack of confidence it its ability to stop proliferation. The collapse of the regime is a direct threat to U.S. national security. The proliferation of nuclear materials and technology increases the threat of nuclear terrorism, threatens regional stability and threatens international security. Combating nuclear terrorism and supporting the nonproliferation regime is an international problem that requires U.S. leadership. The key to achieving this cooperation is a set of comprehensive arms control initiatives that seek a tempered reduction in nuclear arsenals and acknowledge the groundswell of international support for the normative disarmament standard.

Conclusion: The nonproliferation regime can be strengthened through a U.S. policy of graduated disarmament. Negotiating a new Strategic Arms Reduction Treaty that abolishes tactical nuclear weapons, provides for the collective defense of Europe from ballistic missiles and reduces total arsenal levels to a 'parity plus' level of 1000 warheads is the first step toward this effort. Ratifying the Comprehensive Test Ban Treaty is another significant step that supports efforts to restore confidence in the nonproliferation regime. A renewed U.S. commitment to tackle challenging arms control and nonproliferation issues will validate the efficacy of the nonproliferation regime and spark renewed international commitment to proliferation prevention.